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Hladno valjani ploščati izdelki iz maloogljiknih jekel za emajliranje - Tehnični dobavni pogoji

Cold rolled low carbon steel flat products for vitreous enamelling - Technical delivery conditions

Kaltgewalzte Flacherzeugnisse aus weichen Stählen zum Emaillieren - Technische Lieferbedingungen

Produits plats laminés à froid, en acier doux pour émaillage par vitrification - Conditions techniques de livraison

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**Cold rolled low carbon steel flat products for vitreous enamelling
- Technical delivery conditions**

Produits plats laminés à froid, en acier doux pour émaillage
par vitrification - Conditions techniques de livraison

Kaltgewalzte Flacherzeugnisse aus weichen Stählen zum
Emaillieren - Technische Lieferbedingungen

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prEN 10209:2010 (E)

Foreword

This document (prEN 10209:2010) has been prepared by Technical Committee ECISS/TC 109 “Flat products for cold working - Qualities, dimensions, tolerances and specific test”, the secretariat of which is held by AFNOR.

This document will supersede EN 10209:1996

This document is currently submitted to the CEN Enquiry.

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1 Scope

This European Standard applies to cold rolled non-coated low carbon steel flat products in rolled widths equal to or over 600 mm and in thicknesses equal to or less than 3 mm, delivered in sheet, wide strip, slit wide strip or cut lengths obtained from slit wide strip or sheet.

It does not apply to cold rolled narrow strip (rolling width < 600 mm) nor to cold rolled flat products for which there is a specific standard, in particular the following:

- cold-rolled low carbon steel flat products for cold forming (EN 10130);
- cold-rolled non oriented electrical steel sheet and strip delivered in fully processed state (prEN 10106);
- cold-rolled electrical non-alloyed steel sheet and strip delivered in semi-processed state (prEN 10126) ;
- cold-rolled electrical alloyed steel sheet and strip delivered in semi-processed state (prEN 10165);
- cold reduced blackplate (EN 10205);
- steel sheet and strip for welded gas cylinders (prEN 10120);
- hot-rolled flat products made of high yield strength steels for cold forming (prEN 10149);
- cold-rolled uncoated non-alloy mild steel narrow strip for cold forming (prEN 10139);
- cold-rolled structural steels for general purposes.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 10002-1, *Metallic materials - Tensile testing - Part 1: Method of test (at ambient temperature)*.

EN 10021, *General technical delivery requirements for steel and iron products*.

EN 10027-1, *Designation systems for steels - Part 1: Symbolic designation, main symbols*.

EN 10027-2, *Designation systems for steels - Part 2: Numerical systems*.

EN 10049, *Measurement of roughness average Ra and peak count RPc on metallic flat products*.

EN 10079, *Definition and classification of steel products*.

EN 10131, *Cold-rolled uncoated low carbon and high yield strength steel flat products for cold forming - Tolerances on dimensions and shape*.

EN 10204, *Metallic products - Types of inspection documents*.

EN ISO 377, *Steel and steel products. Location and preparation of samples and test pieces for mechanical testing*.

NF EN ISO 7500-1, *Metallic materials - Verification of static uniaxial testing machines - Part 1 : tension/compression testing machines - Verification and calibration of the force measuring system*.

NF EN ISO 9513, *Matériaux métalliques - Etalonnage des extensomètres utilisés lors d'essais uniaxiaux*.

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ISO 10113, *Metallic materials - Sheet and strip - Determination of plastic strain ratio*

3 Terms and definitions

For the purposes of this European Standard the terms and definitions of the cold rolled flat products are those given in EN 10079.

4 Designation

4.1 Steel names are attributed in accordance with EN 10027-1; numerical designations are attributed in accordance with EN 10027-2.

All steels reported in Table 2 are non alloy quality steels.

4.2 Products conforming to this European Standard shall be designated, in order, in the following way:

- a) product designation (e.g. strip, sheet or "slit strip cut longitudinally");
- b) number of this European Standard (EN 10209);
- c) name or numerical designation of the steel, shown in Table 2;
- d) where appropriate, the symbol relating to surface finish (see Table 1).

Examples of conventional designations:

Designation of a steel sheet with the symbolic designation DC01EK and the numerical designation 1.0390 with rough surface finish (*r*):

Sheet EN 10209 DC01EK *r* or

Sheet EN 10209 - 1.0390 *r*

Designation of a wide strip of steel with the symbolic designation DC06ED and the numerical designation 1.0872 with normal surface finish (*m*):

Wide strip EN 10209 - DC06ED *m* or

Wide strip EN 10209 - 1.0872 *m*.

5 Requirements**5.1 Steelmaking and manufacturing processes**

Unless otherwise agreed at the time of ordering, the production methods are left to the discretion of the manufacturer.

The purchaser shall be informed of these processes if he specifies it.

5.2 Method of deoxidation

See Table 2.

5.3 Chemical composition

The maximum values for the chemical compositions based on ladle analysis shall be as given in Table 2.

5.4 Suitability for vitreous enamelling

5.4.1 Qualities DCO1EK, DC04EK, DC05EK and DC06EK are suitable for one or two coats of conventional enamelling.

5.4.2 Qualities DC03ED, DC04ED and DC06ED are suitable for direct enamelling, as well as for the two coat – one fire process and for the special applications of two coat enamelling for sag resistance.

5.4.3 The following methods of test are defined in order to determine the suitability of the steel for enamelling:

- hydrogen permeation test (see Annex A) (alternatively, if agreed at the time of ordering, an enamelling test as described in A.2 may be specified).

NOTE These two tests enable the risk of fish scaling following enamelling to be assessed.

- iron loss test for qualities of steel for direct enamelling as described in 5.4.2 (see Annex B).

5.4.4 An enamel adherence test (see Annex C) is also defined (pretreatment and enamelling conditions shall be agreed at the time of ordering).

5.4.5 The application of the methods of test described in Annexes A, B and C may be the subject of an agreement at the time of ordering.

5.5 Delivery condition

5.5.1 Products specified in this standard are normally supplied in the skin-passed condition. If agreed at the time of ordering non-skin-passed products may be supplied.

5.5.2 The products are normally delivered oiled. In this case, both the surfaces are preserved by a layer of neutral non-drying oil, free of foreign bodies and uniformly spread in such a way that under normal conditions of packaging, transportation, handling and storage the products will show no corrosion for up to three months.

If the conditions of transportation or storage are such that special protection against corrosion is required, the purchaser shall inform the manufacturer at the time of the ordering.

The layer of oils shall be capable of being removed by alkaline solutions or normal solvents.

The choice of protective oils may be the subject of special agreement.

If the purchaser does not require the surfaces to be oiled, this shall be clearly indicated at the time of the ordering.

NOTE If the order is for unoiled products, the manufacturer is not responsible for the risk of rust. The purchaser is also advised that there is a greater risk of the appearance of light scratches during handling, transportation, and application.

5.6 Choice of properties

The products covered by this European Standard correspond to the requirements of Tables 1 and 2. Subject to special agreement, they may be supplied with special suitability for the production of a specific part; in this case a maximum rejection percentage may be set by mutual agreement and acceptance on the basis of mechanical properties does not apply.

5.7 Mechanical properties

The mechanical properties given in Table 2 only apply to skin-passed products. These mechanical properties are valid for the period specified in Table 2 from the date on which the products are made available.

The date of availability shall be notified to the purchaser with reasonable prior notice compatible with the validity of the mechanical properties.

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5.8 Surface characteristics

5.8.1 General

The surface characteristics consist of the surface appearance and surface finish.

5.8.2 Surface appearance

The products are supplied with a surface appearance which does not adversely affect suitability for forming, the application of an enamel coating and the uniform appearance of the enamelled surface on the exposed surface.

When supplied as wide strip and slit strip, the percentage of surface defects may be higher than when supplied as sheet and cut lengths. This shall be taken into account by the purchaser and the permissible percentage of surface defects shall be set by special agreement at the time of ordering. Unless otherwise agreed, a single surface of the product shall comply with the specified requirements. The other surface shall be such that during subsequent treatment it does not have a deleterious effect on the better surface.

5.8.3 Surface finish

The surface finish may be normal or rough.

In the absence of a requirement in the order, products shall be supplied with the normal surface finish.

The limiting figures for average surface roughness for the two types of finish are given in Table 1.

The measurements shall be made in accordance with EN 10049.

If specially agreed at the time of ordering, other ranges for surface specified for specific end uses.

Table 1 — Surface finishes and standard roughness

Surface finish	Symbol	Roughness
Normal	<i>m</i>	$0,6 \mu\text{m} < R_a \leq 1,9 \mu\text{m}$
Rough	<i>r</i>	$R_a > 1,6 \mu\text{m}$

5.9 Stretcher strain marks

All the products are generally subjected to a light skin-pass after annealing at the manufacturer's works to avoid the formation of stretcher strain marks during subsequent forming. The tendency to form such marks may reappear a certain after the skin-pass. It is therefore in the purchaser's interest to form the products as soon as possible.

Quality DC06EK and DC06ED products do not exhibit stretcher strain marks after deformation.

For the other qualities the absence of stretcher strain marks may be guaranteed for six months after the products are made available.

5.10 Weldability

The material is specified as suitable for normal welding procedures as long as the products are degreased beforehand. The welding procedure shall be specified at the time of ordering (see 10 h).

5.11 Tolerances on dimensions and shape

Tolerances on dimensions and shape are given in EN 10131.

6 Tests

6.1 General

6.1.1 The purchaser shall specify at the time of ordering his requirements for:

- type of inspection and testing: specific or non-specific, see EN 10021;
- type of inspection document, see EN 10204.

6.1.2 Specific inspection and testing shall be carried out in accordance with 6.2 to 6.6.

6.1.3 Specific inspection and testing may not be specified either for the product analysis or the surface finish.

6.2 Inspection units

The inspection unit is 30 t or a fraction of 30 t products of the same grade and nominal thickness.

When a wide coil exceeds 30 t, it constitutes a single inspection unit, as do its products.

6.3 Number of tests

For each inspection unit a tensile test shall be carried out, and if required, a determination of r and of the suitability for enamelling (see Table 2 and Annexes A, B, and C).

6.4 Sampling

The requirements of EN ISO 377 and EN 10021 are supplemented by the following specific requirements.

For sheet and cut lengths the selection of products to be tested and the position of the samples in the products is left to the discretion of the inspection representative.

In the case of wide strip and slit wide strip, the sample should preferably be taken from the outer end.

If the width of the product permits, the test pieces for the tensile test shall be taken perpendicular to the direction of rolling.

6.5 Test methods

6.5.1 The products shall be tested in the as-delivered condition. The tests shall be carried out at ambient temperature.

6.5.2 The tensile test shall be carried out as described in EN 10002-1 using type 2 specimens (initial gauge length $L_o = 80$ mm, width $b = 20$ mm).

6.5.3 Surface roughness shall be measured in accordance with EN 10049.

6.5.4 The determination of coefficient r shall be carried out in accordance with ISO 10113.

6.5.5 The tests for suitability for enamelling (see 5.4.3) shall be carried out in accordance with

- annex A for the fish scaling resistance test;
- annex B for the mass loss due to pickling test;
- annex C for the adherence test.

6.5.6 For the determination of the chemical composition the corresponding European Standards shall apply in cases of dispute.